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Extern Host Site: Monsanto

PBL Specifics	
<div>Part I: General Overview of Business</div> <p>Monsanto is a company that is focused on sustainable agriculture through biotechnical and chemical engineering methods. They make products that help farmers get more out of their land. Some of these technologies include plant genetics that build resistance to things like pests, droughts, and herbicides, as well as chemical treatments like Roundup. They have facilities all around the world, but their main headquarters are in St. Louis, MO.</p>	<div>Part II: Job Specifics</div> <p>Although my area of focus was in the Central Lab for the summer of 2016, I was able to sit in on other activities that happened throughout the externship. One of them included being a part of a study on the genetics of plants corn to help increase production yield. Although this is mainly what Monsanto, as a whole, focuses on, it is not a specialty of the Muscatine plant. Scientists from the St. Louis headquarters and research facilities came down to use the Muscatine location as a field for study. At the St. Louis facility, there are many labs and greenhouses to do small-scale studies on their genetically altered plants, but that is not the setting that farmers use to make their money. In order to accurately examine their changes in a situation that their consumers will experience, the researchers will come up to some Iowa locations and generate large test plots to examine the changed species of plants.</p>
<div>Part III: Introduce the Problem</div> <p>In order to produce a larger yield for seed sales, geneticists need to examine the reproductive activity of these plants. Corn can reproduce with itself, but after years of doing this, the seed viability lowers drastically and the genetics become inbred. So to make sure that certain varieties of corn pollinate specific rows of corn, farmers will hire people to detassel specific rows of corn. Biological engineers and geneticists are now looking at genes that could make some corn sterile, saving farmers time and money.</p> <p>The project in the East Campus biology class is going to look at something similar to what Monsanto is doing. With the addition of our new greenhouse, we would like to begin saving heirloom garden seeds each year in order to save the program some money each year. Gardeners need to be very careful when doing so, however. The appeal of heirloom seeds is that their genetics have been preserved for hundreds of years, so the challenge becomes “How can we create an heirloom seed saving garden that preserves the genetic heritage?”.</p>	<div>Part IV: Background</div> <p><u>Content Knowledge:</u> Students will need to know the following pieces of background biology: plant morphology, plant reproduction, plant cell basics, pollinator ecology, genes, traits, propagation, etc. Students will also need to be create a valid scientific method for a long-term research study on the genetics of the plants to be studied. This will be a long-term project that will not be able to be done in a short amount of time (like a unit). Much of the introductory material will be covered with various inquiry investigations that will contribute to the specifics of the study.</p> <p><u>What did the business need?</u> The business needed to examine the cell biology of the plants in order to find and isolate genes that controlled the trait that they were looking for. They then constructed a large-scale, long-term research project in the field, testing for various independent variables, watching for cross contamination, and for “rogue” seeds of varying genetics that did not fit into the traits of the plot it was planted in.</p>
<div>Part V: Business Solution</div> <p>The investigation is still in process, will not be completed until the harvest season, and involves many “trade secrets” that cannot be discussed here. Monsanto, however, hired a few students to collect the data on various traits over the summer. Some of those traits include plant height, quality of tassel formation, the appearance of tillers at the bottom of the plant, the height of the first ear, etc. Many of these traits are going to provide the scientists and engineers with the data to see if the genes were expressed correctly or if they need to go back to the drawing board.</p> <p>One issues that we will run across is the preservation of the genetics of the heirloom plants due to cross contamination. This can be due to many factors including the distance between different varieties, the way certain plants are pollinated, and how to determine when there is a cross contamination. We will need to keep careful, detailed observations and do extensive research beforehand in order to determine the placement of our test plots and whether or not they have been cross contaminated.</p>	<div>Part VI: Student Solutions</div> <p>Students should come to the conclusion that there are different requirements for preserving the genetics of different plants. A large problem that is had in many science classrooms is the set up of the investigation to begin with. Many students simply want to rush around and get the job done, recording down sloppy instructions and methods that lead to sloppy data collections. Because this will be geared toward generating a product for garden consumers of Muscatine, and potentially a large money-drain in the beginning, I believe that students will do a better job than expected.</p> <p>For the first growing season, I anticipate some genes to be crossed and several plants to be wasted due to poor care. This typically happens during the first parts of a project as students do not believe that the project will actually be put into place. Assuming that students put forth a decent effort during the initial inquiry investigations that will help develop the background knowledge, I think that we will certain gain some seeds to save and test the following year. The trick will be to finding a way to record the data in a single space for years to come.</p>